PROJECT NUMBER: 2501
PROJECT TITLE: SMOKE CHEMISTRY
PROJECT LEADER: R. A. COMES
PERIOD COVERED: November, 1989

I. SIDESTREAM SMOKE CHAMBER

A. **Objective**: Design, construct and operate an environmentally controlled chamber to measure selected components of sidestream smoke.

B. **Status**: All analyses of chamber generated samples (except for nitrosamines which are analyzed by BCR personnel) are now conducted by Project personnel utilizing Project instrumentation. Multiple chamber runs were carried out on C20 (European Monitor) and on Monitor-25 cigarettes. Sidestream data obtained included CO, CO_2, NO, ozone, particulate matter, ammonia, nicotine and nitrosamines. The data was reported in a memo issued 11/10/89.

Several Japanese brands were smoked during this reporting period (see Section II., below).

Cigarettes from the analytical/subjective study (X8D9XM, X8D9XO and X8D9XQ) were evaluated in the chamber. Results, including aldehydes, have been tabulated and a memo is in progress.

Methodology for data collection has been successfully developed for use with the instrument for determination of particle size distribution. Programs have been written for transfer to computer and for manipulation of the data utilizing mainframe capabilities. Samples analyzed for nicotine included those for the subjective/analytical study, Monitor-25's and a substantial number of C20 reference cigarettes. They were analyzed by both the XAD and Extrelut procedures. The C20 run data using both methods has been submitted to PED for statistical analysis to answer questions regarding the suitability of the sampling protocol, the acceptability of experimental variation and the feasibility of dropping the Extrelut analysis procedure. The data is currently being analyzed and a report will be issued. The Hewlett-Packard gas chromatograph with NPD and FID detectors and automatic injector has been installed and checked out in the chamber laboratory. It will shortly become the instrument of choice for nicotine analysis. A Hewlett-Packard HPLC has been ordered to facilitate aldehyde analyses. A request has been made and is currently being acted on for the synthesis of new aldehyde and ketone 2,4-DNPH standards by Project 2500 personnel. A new water deionizer system has been installed for use with the ammonia specific ion electrode procedure. Linearity checks using reagents prepared with water from the new system were acceptable. Plans have been formulated and pertinent information forwarded to the vendor to facilitate shipment of the transmissometer. In-house construction of the required stand to mount this instrument will commence shortly. The Beckman CO_2 monitor discussed in the previous report was attached to the mainstream outlet from the

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chamber smoking machine. Attempts at monitoring chamber CO_2 during smoke runs was successful in that a response was observed, but unsuccessful in that the read-out was extremely noisy. Other monitors for CO_2 and CO will be investigated. Mainstream TPM data can be collected using the large TPM pad supplied with the 30-port smoker.

C. **Plans**: Chamber runs will continue as required. A new monitor, IM13, is currently being evaluated using all chamber parameters. The transmissometer should be delivered early in December and will be installed and placed into routine operation. The third instrument for generating cigarette smoke particle information (total number of particles) will be investigated shortly.

II. SIDESTREAM SMOKE

A. **Objective**: Conduct studies on sidestream smoke including: development of methods for collection and analysis of sidestream semivolatiles and gas phase; visibility determinations; analysis of selected materials relating to sidestream odor and irritation; development of proprietary products.

B. **Status**: A series of Japanese cigarettes (Mild Seven Super Lights, Mild Seven Lights, Mild Seven, Lark Super Lights and Lark) was investigated on the prototype Coresta smoking machine and in the sidestream chamber to determine mainstream and sidestream smoke data. Three runs of each test model were carried out in the chamber to generate sidestream particulate data using the TEOM apparatus. Monitor-25 TEOM data was obtained on four replicates. Duplicate runs were conducted utilizing the Coresta smoking machine except in the case of Monitor-25 and Mild Seven where three runs each were carried out. Coresta data generated included static TPM, static burn times, dynamic TPM (mainstream and sidestream) and puff count. The information was compared with CI TPM and visibility data and was reported in a memo issued 11/7/89.

III. MISCELLANEOUS

1. An analysis was carried out on products derived from a nicotine destruction experiment. The results were reported in a memo.

2. Gc/ms and pyrolysis/gc/ms analyses were conducted on various samples as requested. Memos are being written in support on these analyses.

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